



WHAT IS CLAIMED IS:

1. A process for producing a bismuth-containing oxide thin film by Atomic Layer Deposition (ALD), wherein an organic bismuth compound having at least one silylamido ligand is used as a source material for the bismuth-containing oxide thin film.

2. The process according to Claim 1, wherein the organic bismuth compound comprises a tris(bis(trialkylsilyl)amido) bismuth(III) compound, in which each alkyl is a lower alkyl group having 1 to 4 carbon atoms.

3. The process according to Claim 2, wherein each alkyl is the same.

4. The process according to Claim 2, wherein each alkyl is different.

5. The process according to Claim 16, wherein one or more tris(bis(trialkylsilyl)amido) bismuth(III) compound is selected from the group consisting of tris(bis(trimethylsilyl)amido) bismuth(III), tris(bis(ethyldimethylsilyl)amido) bismuth(III), tris(bis(n-butyldimethylsilyl)amido) bismuth(III), and tris(bis(triethylsilyl)amido) bismuth(III) and tris(bis(tri-n-propylsilyl)amido) bismuth(III).

6. The process according to Claim 1, wherein the organic bismuth compound comprises a bismuth compound with 1 to 3 silylamido ligands having the formula of Equation 1:



wherein each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> is independently selected from the group consisting of:

linear or branched C<sub>1</sub>-C<sub>20</sub> alkyl and C<sub>1</sub>-C<sub>20</sub> alkenyl groups,

halogenated alkyl and halogenated alkenyl groups, wherein the halogenated alkyl and halogenated alkenyl groups have at least one hydrogen atom replaced with a fluorine, chlorine, bromine or iodine atom,

carbocyclic groups; and

heterocyclic groups.

7. The process according to Claim 6, wherein at least one of R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> is a C<sub>1</sub>-C<sub>20</sub> alkyl or a C<sub>1</sub>-C<sub>20</sub> alkenyl selected from the group consisting of methyl, ethyl, n- and i-propyl, n-, sec- and t-butyl.

8. The process according to Claim 6, wherein at least one of R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> is the carbocyclic group and the carbocyclic group is an aryl.

9. The process according to Claim 6, wherein at least one of R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> is the carbocyclic group selected from the group consisting of phenyl, alkylaryl, and halogenated carbocyclic groups.

10. A process for depositing a bismuth oxide layer on a substrate by Atomic Layer Deposition (ALD) comprising:

feeding into a reaction space a vapor phase pulse of an organic bismuth compound source material having at least one bis(trialkylsilyl)amido ligand; and

pulsing into the reaction space a pulse of an oxygen source material capable of forming an oxide with the organic bismuth compound source material.

11. The process according to Claim 10, wherein the feeding and pulsing produce a ternary oxide thin film.

12. The process according to Claim 11, wherein the ternary oxide thin film comprises a second metal source material selected from the group consisting of copper, titanium, tantalum, calcium, strontium, silicon and aluminum oxides.

13. The process according to Claim 12, wherein the ternary oxide thin film comprises Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub>.

14. The process according to Claim 10, wherein the feeding and pulsing produce a multicomponent oxide thin film.

15. The process according to Claim 14, wherein the multicomponent oxide thin film comprises at least two further metal oxides selected from the group consisting of copper, titanium, tantalum, calcium and strontium oxides.

16. The process according to Claim 15, wherein the multicomponent oxide thin film is selected from the group consisting of Bi<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub>, (Bi,La)<sub>4</sub>Ti<sub>3</sub>O<sub>12</sub>, SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub>, and Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8+x</sub>.

17. The process according to Claim 10, wherein the bismuth oxide layer is deposited at a temperature of less than about 250°C.

18. The process according to Claim 17, wherein the bismuth oxide layer is deposited at a deposition temperature in the range of about 150°C to about 220°C.

19. The process according to Claim 12, wherein the second metal oxide is deposited from a second metal source material selected from the group consisting of halides and metal organic compounds.

20. The process according to Claim 19, wherein the second metal source material is selected from the group consisting of alkoxy, alkylamino, cyclopentadienyl, dithiocarbamate and betadiketonate compounds.

21. The process according to Claim 19, wherein the second metal source material comprises a double metal precursor in which each molecule contains two metals in a discrete ratio.

22. The process according to Claim 10, wherein the oxygen source material comprises one or more reactants selected from the group consisting of water, oxygen, hydrogen peroxide, aqueous solution of hydrogen peroxide, ozone, oxides of nitrogen, halide-oxygen compounds, peracids, alcohols, alkoxides, and oxygen-containing radicals.

23. The process according to Claim 10, further comprising purging the reaction space with an inactive gas between pulses.

24. The process according to Claim 10, wherein feeding into the reaction space the vapor phase pulse of the organic bismuth compound comprises mixing a carrier gas with the vapor phase pulse.

25. The process according to Claim 10, wherein the bismuth oxide layer is deposited to serve as a functional layer which is selected from the group consisting of a ferroelectric layer, a dielectric layer, and a super-conducting layer.

26. A process for forming a bismuth-containing multicomponent oxide thin film by Atomic Layer Deposition (ALD) on a substrate in a reaction space, comprising:

alternately feeding into the reaction space vapor phase pulses of a first metal source material, a second metal source material, and an oxygen source material capable of forming an oxide with the first metal source material and the second metal source material, wherein

said first metal source material is an organic bismuth compound having at least one bis(trialkylsilyl)amido ligand, and

said second metal source material is a volatile compound of a transition metal or a volatile compound of a main group metal.

27. The process according to Claim 26, wherein one or more said second metal source material comprises one or more reactants selected from the group consisting of groups 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 of a periodic table of elements.

28. The process according to Claim 26, wherein each vapor phase pulse of the first and second metal source materials is followed by a pulse of the oxygen source material.

29. The process according to Claim 28, wherein a ratio of bismuth precursor cycles to second metal source cycles is from about 10:1 to about 1:10, wherein each cycle includes a pulse of an oxygen source material.

30. The process according to Claim 29, wherein the ratio is from about 6:1 to about 1.5:1 and the multicomponent oxide thin film contains a stoichiometric surplus of 1 to 20 atomic percentage of bismuth.

31. The process according to Claim 26, further comprising:

depositing a first laminar metal oxide layer formed from the first metal source material and a second laminar metal oxide layer formed the second metal source material; and

annealing a selected ratio of the first and second laminar layers to provide a ferroelectric phase.

32. The process according to Claim 26, wherein the multipcomponent oxide thin film is a ternary oxide film, the method further comprising:

feeding alternating pulses of the organic bismuth compound and the second metal source material, followed by a pulse of the oxygen source material, into the reaction space to form an amorphous film; and

annealing the amorphous film in the presence of an oxygen-containing gas.

33. The process according to Claim 26, wherein the multicomponent thin film formed is selected from the group consisting of  $\text{Bi}_4\text{Ti}_3\text{O}_{12}$ ,  $(\text{Bi},\text{La})_4\text{Ti}_3\text{O}_{12}$ ,  $\text{SrBi}_2\text{Ta}_2\text{O}_9$  and  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ .

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FILE 'LREGISTRY' ENTERED AT 17:32:14 ON 28 JUL 2006  
L1 STR

FILE 'REGISTRY' ENTERED AT 17:58:58 ON 28 JUL 2006  
L2 1 S L1  
E C H BI N SI/ELF  
L3 65 S (C(L)H(L)BI(L)N(L)SI)/ELS  
L4 22 S L3 (L) 5/ELC.SUB  
L5 43 S L3 NOT L4

FILE 'HCAPLUS' ENTERED AT 18:03:26 ON 28 JUL 2006  
L6 41 S VEHKAMAKI ?/AU  
L7 20 S HATANPAA ?/AU  
L8 260 S RITALA ?/AU  
L9 405 S LESKELA ?/AU  
L10 5 S L6 AND L7 AND L8 AND L9  
SEL L10 1-5 RN

FILE 'REGISTRY' ENTERED AT 18:03:42 ON 28 JUL 2006  
L11 49 S E1-E49  
L12 8 S L11 AND BI/ELS

FILE 'HCAPLUS' ENTERED AT 18:06:03 ON 28 JUL 2006  
SEL L10 2 RN

FILE 'REGISTRY' ENTERED AT 18:08:39 ON 28 JUL 2006  
L13 4 S E50-E53

FILE 'HCA' ENTERED AT 18:34:25 ON 28 JUL 2006  
L14 5169 S PEALD OR ALD OR (AT OR ATOMIC?) (3A) LAYER? (3A) DEPOSIT?  
L15 117195 S (CVD OR (CHEMICAL? OR CHEM) (2A) (VAPOR? OR VAPOUR?) (2A) D  
L16 64316 S FERROELEC? OR FERRO (2A) ELEC?  
L17 39993 S (AT OR ATOMIC?) (2A) (LAYER? OR EPITAX?) OR LAYER? (2A) EPI

L18 166474 S (VAPOR? OR VAPOUR?) (2A) DEPOSIT?  
L19 2622 S ?SILYLAMID? OR ?SILYL(W) AMID?

FILE 'REGISTRY' ENTERED AT 18:40:25 ON 28 JUL 2006  
E BISMUTH/CN  
L20 1 S E3

FILE 'HCA' ENTERED AT 18:40:39 ON 28 JUL 2006  
L21 QUE L20 OR BI OR BISMUTH#  
L22 30 S L19 AND L21  
L23 4 S L22 AND (L14-L18)  
L24 36 S L4  
L25 26 S L5  
L26 8 S L24 AND (L14-L18)  
L27 0 S L25 AND (L14-L18)

FILE 'LCA' ENTERED AT 18:44:01 ON 28 JUL 2006  
L28 7651 S (FILM? OR THINFILM? OR LAYER? OR OVERLAY? OR OVERLAID?)

FILE 'HCA' ENTERED AT 18:45:01 ON 28 JUL 2006  
L29 215582 S OXIDE#(2A)L28  
L30 4 S L22 AND L29  
L31 5 S L24 AND L29  
L32 0 S L25 AND L29  
L33 9 S L23 OR L26 OR L30 OR L31  
L34 28 S L24 NOT L33  
L35 25 S L25 NOT (L33 OR L34)  
L36 27 S L34 AND 1840-2003/PY,PRY  
L37 24 S L35 AND 1840-2003/PY,PRY

FILE 'REGISTRY' ENTERED AT 18:49:52 ON 28 JUL 2006

=> d 12 que stat  
L1 STR

Bi※N※Si  
1 2 3

NODE ATTRIBUTES:

NSPEC IS RC AT 1  
NSPEC IS RC AT 2

NSPEC IS RC AT 3  
DEFAULT MLEVEL IS ATOM  
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
RING(S) ARE ISOLATED OR EMBEDDED  
NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE  
L2 1 SEA FILE=REGISTRY SSS SAM L1

100.0% PROCESSED 3 ITERATIONS 1 ANSWERS  
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FULL FILE PROJECTIONS: ONLINE \*\*COMPLETE\*\*  
BATCH \*\*COMPLETE\*\*  
PROJECTED ITERATIONS: 3 TO 163  
PROJECTED ANSWERS: 1 TO 80

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=> d 133 1-9 cbib abs hitstr hitind

L33 ANSWER 1 OF 9 HCA COPYRIGHT 2006 ACS on STN  
142:440314 Process for producing **oxide** films.

Vehkamaki, Marko; Hatanpaa, Timo; Ritala, Mikko; Leskela, Markku  
(Finland). U.S. Pat. Appl. Publ. US 2005089632 A1 20050428, 9 pp.  
(English). CODEN: USXXCO. APPLICATION: US 2003-696591 20031028.

AB A process for producing **bismuth**-contg. **oxide**  
thin films by **At. Layer**

**Deposition**, including using an org. **bismuth** compd.  
having at least one **silylamido** ligand as a source material  
for the **bismuth** oxide. **Bismuth**-contg.  
**oxide** thin films produced by the preferred

embodiments can be used, for example, as **ferroelec.** or dielec. material in integrated circuits and/or as superconductor materials.

IC ICM C23C016-00  
INCL 427248100  
CC 76-8 (Electric Phenomena)  
ST **PEALD PECVD bismuth ferroelec**  
thin film  
IT **Atomic layer epitaxy**  
    **Ferroelectric films**  
    (**PEALD process for bismuth-contg.**  
    **oxide film for ferroelec. device**)  
IT **Vapor deposition process**  
    (**plasma; PEALD process for bismuth-contg.**  
    **oxide film for ferroelec. device**)  
IT 11115-71-2, **Bismuth titanium oxide** 114901-61-0,  
**Bismuth calcium copper strontium oxide** 166877-45-8,  
**Bismuth strontium tantalum oxide** 185619-35-6,  
**Bismuth lanthanum titanium oxide**  
    (**PEALD process for bismuth-contg.**  
    **oxide film for ferroelec. device**)

L33 ANSWER 2 OF 9 HCA COPYRIGHT 2006 ACS on STN

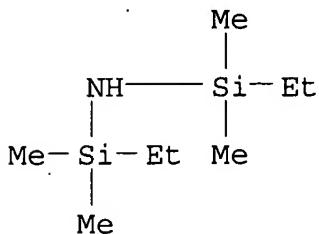
142:85289 **Bismuth precursors for atomic**  
**layer deposition of bismuth-containing**  
**oxide films.** Vehkamaeki, Marko; Hatanpaeae, Timo;  
Ritala, Mikko; Leskelae, Markku (Laboratory of Inorganic Chemistry,  
Department of Chemistry, University of Helsinki, Helsinki,  
FIN-00014, Finland). *Journal of Materials Chemistry*, 14(21),  
3191-3197 (English) 2004. CODEN: JMACEP. ISSN: 0959-9428. OTHER  
SOURCES: CASREACT 142:85289. Publisher: Royal Society of Chemistry.

AB Several **Bi** amides and a **Bi** thioamide compd.  
were synthesized and characterized to find volatile **Bi**  
precursors for **at. layer deposition** (**ALD**) of oxide materials. Crystal structures of **Bi**  
(N(SiMe<sub>3</sub>)<sub>2</sub>)<sub>3</sub> and **Bi**(SC(Me)NPri)<sub>3</sub> are reported. Based on  
precursor characterization **Bi**(N(SiMe<sub>3</sub>)<sub>2</sub>)<sub>3</sub> was selected for  
film deposition expts. Alternate surface reactions of **Bi**  
(N(SiMe<sub>3</sub>)<sub>2</sub>)<sub>3</sub> and H<sub>2</sub>O can be used for **ALD** of amorphous  
**BiOx**, **Bi-Ta-O** and **Sr-Bi-Ta-O** at 190-200°.  
After post-deposition annealing at 800° in O the **SrBi<sub>2</sub>Ta<sub>2</sub>O<sub>9</sub>**  
layered perovskite phase was obtained.

IT 811788-47-3P 811788-49-5P 811788-51-9P  
 (prepn. and thermal decompn.)

RN 811788-47-3 HCA

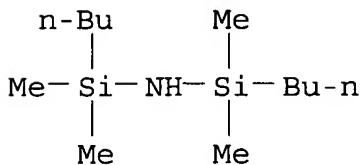
CN Silanamine, 1-ethyl-N-(ethyldimethylsilyl)-1,1-dimethyl-,  
 bismuth(3+) salt (9CI) (CA INDEX NAME)



●1/3 Bi(III)

RN 811788-49-5 HCA

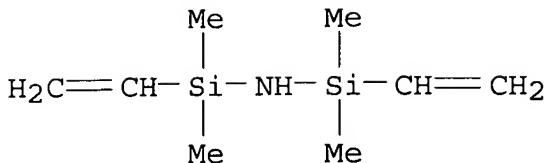
CN Silanamine, 1-butyl-N-(butyldimethylsilyl)-1,1-dimethyl-,  
 bismuth(3+) salt (9CI) (CA INDEX NAME)



●1/3 Bi(III)

RN 811788-51-9 HCA

CN Silanamine, 1-ethenyl-N-(ethenyldimethylsilyl)-1,1-dimethyl-,  
 bismuth(3+) salt (9CI) (CA INDEX NAME)



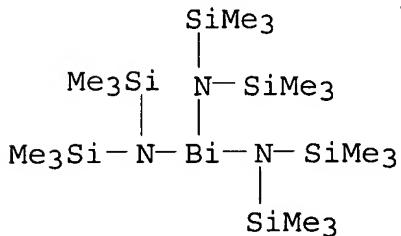
●1/3 Bi(III)

IT 76505-24-3P

(prepn., crystal structure, thermal decompn. and precursor for  
 at. layer deposition of  
 bismuth oxide films)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



CC 78-7 (Inorganic Chemicals and Reactions)  
 Section cross-reference(s): 75

ST bismuth silylamide prep thermal decompn  
 potential oxide precursor; atomic layer  
 deposition bismuth oxide film  
 silylamide precursor; crystal structure bismuth  
 trimethylsilylamide thioamide complex

IT Coating process  
 (at. layer deposition; prep. of  
 bismuth amide precursors for at. layer  
 deposition of bismuth-contg. oxide  
 films)

IT Thermal decomposition  
 (of bismuth amide complexes)

IT Crystal structure  
 Molecular structure

(of **bismuth bis(trimethylsilyl)amide**  
and **isopropylamide** complexes)

IT 1304-76-3P, **Bismuth oxide**, preparation  
50811-07-9P, **Bismuth strontium tantalum oxide**  
(Bi<sub>2</sub>SrTa<sub>2</sub>O<sub>9</sub>) 140883-51-8P, **Bismuth tantalum**  
**oxide** 166877-45-8P, **Bismuth strontium tantalum**  
**oxide**  
(at. **layer deposition** of films from  
**bismuth hexamethylsilylamine** precursor)

IT 57376-43-9P 811788-47-3P 811788-49-5P  
811788-51-9P 811788-55-3P 811788-57-5P  
(prepn. and thermal decompn.)

IT 76505-24-3P  
(prepn., crystal structure, thermal decompn. and precursor for  
at. **layer deposition** of  
**bismuth oxide** films)

IT 220057-73-8  
(reactant for at. **layer deposition**  
of **bismuth strontium tantalum** films)

IT 6074-84-6, **Tantalum pentaethoxide**  
(reactant for at. **layer deposition**  
of **bismuth tantalum** films)

IT 108-18-9, **Diisopropylamine** 109-89-7, **Diethylamine**, reactions  
999-97-3, **Hexamethyldisilazane** 2253-73-8, **Isopropyl isothiocyanate**  
7691-02-3 17882-94-9 82356-80-7  
(reactant for prepn. of **bismuth** amide compd.)

IT 22687-02-1P, **[2-(tert-Butylamino)ethyl]dimethylamine**  
(reactant for prepn. of **bismuth** amide compd.)

L33 ANSWER 3 OF 9 HCA COPYRIGHT 2006 ACS on STN  
142:15323 **MOCVD** sources, compositions therefor, and  
composition-regulated **ferroelectric** film deposition  
therewith. Onosawa, Kazuhisa; Yoshinaka, Atsuya; Yamada, Naoki;  
Sakurai, Atsushi (Asahi Denka Co., Ltd., Japan). Jpn. Kokai Tokkyo  
Koho JP 2004332033 A2 20041125, 16 pp. (Japanese). CODEN: JKXXAF.  
APPLICATION: JP 2003-128115 20030506.

AB The films, i.e., Bi titanate-type double **oxide**  
**films** useful for film capacitors, are deposited from sources  
consisting of 1:(0.05-10) (mol) Bi[NR<sub>1</sub>(SiR<sub>2</sub>R<sub>3</sub>R<sub>4</sub>)]<sub>3</sub> and Ti(NR<sub>5</sub>R<sub>6</sub>)<sub>4</sub>  
[R<sub>1</sub> = H, C<sub>1-4</sub> alkyl, SiR<sub>7</sub>R<sub>8</sub>R<sub>9</sub>; R<sub>2</sub>-R<sub>4</sub> = H, C<sub>1-4</sub> alkyl (essentially  
contg. C<sub>1-4</sub> alkyl); R<sub>5</sub>, R<sub>6</sub> = H, C<sub>1-8</sub> hydrocarbyl, SiR<sub>10</sub>R<sub>11</sub>R<sub>12</sub>  
(essentially contg. H); R<sub>7</sub>-R<sub>9</sub>, R<sub>10</sub>-R<sub>12</sub> = H, C<sub>1-4</sub> alkyl (essentially

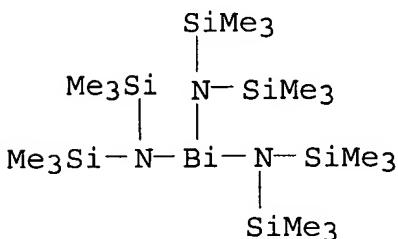
contg. Cl-4 alkyl)]. The sources may contain 5-100 parts (to 1 parts the Bi compds.) org. solvents.

IT 76505-24-3

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C23C016-40

ICS C07F007-00; C07F019-00; H01L021-316; H01L027-105

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 57, 75

ST ferroelec bismuth titanate MOCVD source

decomposability optimized; organometallic bismuth titanium CVD source oxide deposition; trimethylsilylaminobismuth diethylaminotitanium ferroelec film MOCVD source

IT Ferroelectric films

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT Vapor deposition process

(metalorg.; MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 142-68-7, Tetrahydropyran

(MOCVD source; MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 4419-47-0 76505-24-3

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

IT 797756-87-7P, Bismuth silicon titanium oxide

(MOCVD sources producing bismuth titanate-type ferroelec. films with well-controlled compns.)

L33 ANSWER 4 OF 9 HCA COPYRIGHT 2006 ACS on STN

141:430841 Compositions containing bismuth silylamine complexes and rare earth silylamine complexes, their **CVD** sources, and manufacture of rare earth-substituted bismuth titanate thin films using them. Onosawa, Kazuhisa; Yoshinaka, Atsuya; Yamada, Naoki; Sakurai, Atsushi (Asahi Denka Kogyo K. K., Japan). Jpn. Kokai Tokkyo Koho JP 2004331542 A2 20041125, 18 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-128116 20030506.

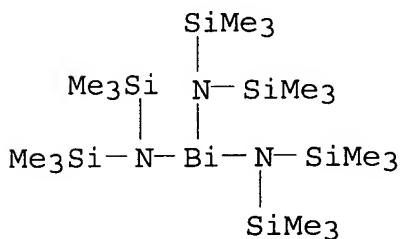
AB The compns. contain 1 mol part  $\text{Bi}(\text{NR}_1\text{SiR}_2\text{R}_3\text{R}_4)_3$  and 0.01-1 mol part  $\text{M}(\text{NR}_5\text{SiR}_6\text{R}_7\text{R}_8)_3$  ( $\text{R}_1, \text{R}_5 = \text{H}$ ,  $\text{C}_1\text{-4 alkyl}$ ,  $\text{SiR}_9\text{R}_{10}\text{R}_{11}$ ; one of  $\text{R}_2\text{-R}_4$ , one of  $\text{R}_6\text{-R}_8$ , one of  $\text{R}_9\text{-R}_{11} = \text{C}_1\text{-4 alkyl}$ ; other two of  $\text{R}_2\text{-R}_4$ , other two of  $\text{R}_6\text{-R}_8$ , other two of  $\text{R}_9\text{-R}_{11} = \text{H}$ ,  $\text{C}_1\text{-4 alkyl}$ ;  $\text{M} = \text{rare earth metal}$ ). Preferably, the compns. further contain  $\text{Ti}(\text{NR}_{15}\text{R}_{16})_4$  (one of  $\text{R}_{15}$  and  $\text{R}_{16} = \text{H}$ ,  $\text{C}_1\text{-8 hydrocarbyl}$ ,  $\text{SiR}_{17}\text{R}_{18}\text{R}_{19}$ ; the other of  $\text{R}_{15}$  and  $\text{R}_{16} = \text{C}_1\text{-8 hydrocarbyl}$ ,  $\text{SiR}_{17}\text{R}_{18}\text{R}_{19}$ ; one of  $\text{R}_{17}\text{-R}_{19} = \text{C}_1\text{-4 alkyl}$ ; other two of  $\text{R}_{17}\text{-R}_{19} = \text{H}$ ,  $\text{C}_1\text{-4 alkyl}$ ). The films are useful for **ferroelec.** nonvolatile memory devices.

IT 76505-24-3

(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as **CVD** sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C07F019-00

ICS C23C016-40; H01L021-316; C07F007-02; C07F009-94

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 75

ST silylamine bismuth complex **CVD** **ferroelec** film;  
**CVD** **ferroelec** film rare earth silylamine complex;  
rare earth bismuth titanate **ferroelec** film **CVD**;  
**ferroelec** nonvolatile memory device rare earth bismuth titanate

IT **Vapor deposition process**  
(chem.; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as CVD sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

IT **Nonvolatile memory devices**  
(**ferroelec.**; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as CVD sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

IT **Ferroelectric memory devices**  
(nonvolatile; compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as CVD sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

IT 4419-47-0 35788-99-9 41836-23-1 **76505-24-3**  
(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as CVD sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

IT 637776-64-8P, Bismuth lanthanum silicon titanium oxide  
795288-05-0P, Bismuth niobium silicon titanium oxide  
(compns. contg. bismuth silylamine complexes and rare earth silylamine complexes as CVD sources for manuf. of rare earth-substituted bismuth titanate thin films for **ferroelec.** nonvolatile memory devices)

L33 ANSWER 5 OF 9 HCA COPYRIGHT 2006 ACS on STN

136:286888 **Vapor deposition** of metal oxides, silicates and phosphates, and silicon dioxide. Gordon, Roy G.; Becker, Jill; Hausmann, Dennis; Suh, Seigi (President and Fellows of Harvard College, USA). PCT Int. Appl. WO 2002027063 A2 20020404, 51 pp. DESIGNATED STATES: W: JP, KR, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US30507 20010928. PRIORITY: US 2000-2000/PV23628U 20000928; US 2000-2000/PV253917 20001129.

AB Metal silicates or phosphates are deposited on a heated substrate by the reaction of vapors of alkoxy silanols or alkyl phosphates along with reactive metal amides, alkyls or alkoxides. For example, vapors of tris-(ter-butoxy)silanol react with vapors of tetrakis(ethylmethylamido)hafnium to deposit Hf silicate on surfaces heated to 300°. The product film has a very uniform

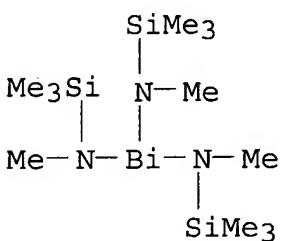
stoichiometry throughout the reactor. Similarly, vapors of diisopropylphosphate react with vapors of Li bis(ethyldimethylsilyl)amide to deposit Li phosphate films on substrates heated to 250°. Supplying the vapors in alternating pulse produces these same compns. with a very uniform distribution of thickness and excellent step coverage.

IT 7566-57-6 76505-24-3

(vapor deposition of metal silicates and phosphates by reacting alkoxy silanol or alkylphosphates with metal or metalloid compd.)

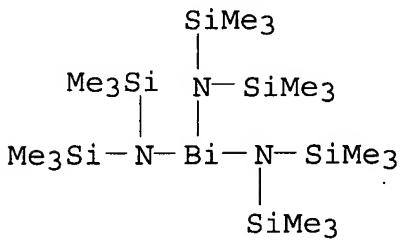
RN 7566-57-6 HCA

CN Bismuthinetriamine, N,N',N'''-trimethyl-N,N',N'''-tria(trimethylsilyl)-(9CI) (CA INDEX NAME)



RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)-(9CI) (CA INDEX NAME)



IC ICM C23C016-40

CC 75-1 (Crystallography and Liquid Crystals)

ST atomic layer deposition metal silicate phosphate oxide silica; CVD metal silicate phosphate oxide silica

IT Vapor deposition process

(at. layer deposition;

vapor deposition of metal silicates and

phosphates by reacting alkoxy silanol or alkylphosphates with

metal or metalloid compd.)

IT Vapor deposition process  
(chem.; vapor deposition of metal silicates and phosphates by reacting alkoxy silanol or alkyl phosphates with metal or metalloid compd.)

IT Engines  
(fuel injectors; vapor deposition of metal silicates and phosphates by delivering pulses of solns. of precursors into nitrogen carrier gas using)

IT Valves  
(sampling; vapor deposition of metal silicates and phosphates by delivering pulses of solns. of precursors into nitrogen carrier gas using)

IT Organometallic compounds  
(vapor deposition of material comprising oxygen and metals by exposing heated surface alternately to organometallic compds. then to arene hydrate)

IT 128870-07-5, Benzene hydrate 406462-51-9  
(pure and substituted; vapor deposition of material comprising oxygen by exposing substrate to)

IT 12651-01-3, Phosphorus oxide (PO<sub>3</sub>)  
(vapor deposition of material comprising phosphorus by exposing substrate to)

IT 154030-95-2  
(vapor deposition of material comprising silicon by exposing substrate to)

IT 75-65-0, tert-Butanol, processes 1314-23-4, Zirconium diOxide, processes 1314-61-0, Tantalum oxide (Ta<sub>2</sub>O<sub>5</sub>) 7631-86-9, Silicon dioxide, processes 7732-18-5, Water, processes 12055-23-1, Hafnium Oxide  
(vapor deposition of metal oxides by exposing heated surface alternately to metal amides then to water or alc.)

IT 75-24-1, Trimethylaluminum 121-43-7, Trimethyl borate 506-82-1, Dimethylcadmium 542-63-2, Diethylberyllium 544-97-8, Dimethylzinc 546-68-9, Tetrakis(isopropanolato)titanium 557-20-0, Diethylzinc 593-91-9, Trimethylbismuthine 617-85-6, Triethylstibine 813-78-5 867-97-0, Tris(diethylamino)borane 1066-77-9, Tetrakis(dimethylamino)stannane 1070-89-9, Sodium bis(trimethylsilyl)amide 1271-24-5, Chromocene 1271-86-9 1272-21-5, Tris( $\eta$ 5-cyclopentadienyl)gadolinium 1272-23-7, Tris( $\eta$ 5-cyclopentadienyl)lanthanum 1272-26-0, Tris( $\eta$ 5-cyclopentadienyl)thulium 1273-98-9,

Tris( $\eta$ 5-cyclopentadienyl)neodymium 1277-43-6, Cobaltocene  
1277-47-0, Vanadocene 1294-07-1, Tris( $\eta$ 5-  
cyclopentadienyl)yttrium 1295-20-1, Tris( $\eta$ 5-  
cyclopentadienyl)ytterbium 1298-53-9, Tris( $\eta$ 5-  
cyclopentadienyl)cerium 1298-54-0 1298-55-1,  
Tris( $\eta$ 5-cyclopentadienyl)samarium 1312-81-8, Lanthanum oxide  
1316-98-9 1335-30-4, Aluminum Silicate 1445-79-0,  
Trimethylgallium 1611-31-0 1624-01-7,  
Tetrakis(dimethylamino)silane 2081-12-1, Tetrakis(tert-  
butanolato)zirconium 2172-02-3 3236-82-6 3275-24-9,  
Tetrakis(dimethylamido)titanium 3323-04-4,  
Bis(bis(trimethylsilyl)amido)cadmium 3385-78-2, Trimethylindium  
3999-27-7, Bis(bis(trimethylsilyl)amido)zinc 4039-32-1, Lithium  
bis(trimethylsilyl)amide 4104-81-8 4375-83-1,  
Tris(dimethylamino)borane 4419-47-0, Tetrakis(diethylamido)titanium  
6074-84-6 6596-96-9, Hexamethylarsenous triamide 7289-92-1  
7344-40-3, Tetrakis(dimethylamino)germane 7529-46-6 7529-48-8  
7566-57-6 10377-52-3, Lithium Phosphate 11077-59-1,  
Tris(cyclopentadienyl) praseodymium 12078-25-0,  
Dicarbonyl( $\eta$ 5-cyclopentadienyl)cobalt 12212-68-9,  
Bis(ethylbenzene)chromium 12261-30-2 12636-72-5,  
Bis( $\eta$ 5-cyclopentadienyl)dimethylzirconium 13801-49-5,  
Tetrakis(diethylamido)zirconium 13859-65-9,  
Tetrakis(trifluorophosphine)nickel 14096-82-3,  
Tricarbonyl(nitrosyl)cobalt 14314-61-5 14760-22-6,  
Bis(bis(trimethylsilyl)amido)iron 15112-89-7,  
Tris(dimethylamino)silane 15821-76-8 16530-82-8 17048-10-1,  
Tetrakis(diethylamino)silane 18166-43-3 18741-03-2, Magnesium  
bis(bis(trimethylsilyl)amide) 19756-04-8,  
Tetrakis(dimethylamido)zirconium 19782-68-4,  
Tetrakis(dimethylamido)hafnium 19824-55-6,  
Tetrakis(diethylamido)hafnium 19824-56-7 19824-57-8  
19824-58-9, Pentakis(dimethylamido)niobium 19824-59-0 19824-60-3  
19851-68-4, Tris(diisopropylamido)chromium 20302-36-7,  
Tris(cyclopentadienyl)indium 20607-91-4 21941-96-8,  
Tetrakis(diethylamino)stannane 22999-67-3,  
Tris(bis(trimethylsilyl)amido)iron 25169-05-5 25605-37-2  
25733-02-2, Beryllium, Bis(bis(trimethylsilyl)amino)- 29865-05-2  
31978-09-3, Tetrakis(methylamino)silane 32093-39-3,  
Hexakis(dimethylamido)dialuminum 32877-00-2,  
Bis(ethylbenzene)molybdenum 33851-46-6,  
Tetrakis(dimethylamido)molybdenum 33851-47-7 34822-90-7,

Cyclopentadienyl thallium 35450-28-3,  
Tris(bis(trimethylsilyl)amido)gallium 35450-29-4,  
Tris(bis(trimethylsilyl)amido)indium 35788-99-9,  
Tris(bis(trimethylsilyl)amido)lanthanum 35789-00-5,  
Tris(bis(trimethylsilyl)amido)praseodymium 35789-01-6,  
Tris(bis(trimethylsilyl)amido)samarium 35789-02-7 35789-03-8  
35789-04-9, Tris(bis(trimethylsilyl)amido)lutetium 37512-28-0  
37512-29-1, Tris(bis(trimethylsilyl)amido)titanium 37512-30-4,  
Tris(bis(trimethylsilyl)amido)vanadium 37512-31-5 38182-82-0,  
Tetrakis(diethylamino)germane 38227-87-1 39330-74-0,  
Tris( $\eta$ -cyclopentadienyl)erbium 40678-58-8,  
Tetrakis(diethylamido)thorium 40678-59-9,  
Tetrakis(diethylamido)uranium 40949-94-8, Potassium  
bis(trimethylsilyl)amide 41836-21-9, Tris(bis(trimethylsilyl)amido)  
cerium 41836-23-1, Tris(bis(trimethylsilyl)amido)neodymium  
41836-27-5 41836-28-6, Tris(bis(trimethylsilyl)amido)yttrium  
41836-29-7, Tris(bis(trimethylsilyl)amido)ytterbium 51956-20-8,  
Hexakis(dimethylamido)dimolybdenum 54123-86-3 54935-70-5  
55147-59-6, Bis(bis(trimethylsilyl)amino)plumbylene 55147-78-9,  
Bis(bis(trimethylsilyl)amino)stannylene 55147-79-0 55147-80-3  
55147-81-4 55290-25-0, Bis(bis(trimethylsilyl)amino)germylene  
55940-04-0 57088-64-9 57088-65-0 59671-98-6 61361-87-3  
61361-88-4 62419-10-7 63084-58-2 63226-58-4 63757-86-8,  
Magnesium bis(cyclopentadienide) 63833-49-8 63833-51-2  
64561-25-7 67313-80-8 67506-86-9 67938-78-7 68136-20-9,  
Lanthanum Silicate 68193-40-8, Bis( $\eta$ -tert-  
butylcyclopentadienyl)dimethylzirconium 68959-87-5 69021-85-8  
69021-86-9, Tris(isopropylcyclopentadienyl) praseodymium  
69927-52-2, Tris(bis(trimethylsilyl)amido)uranium 70309-68-1  
72220-23-6 72220-24-7 72260-43-6 73138-26-8,  
Bis( $\eta$ -cyclopentadienyl)manganese 74507-61-2,  
Bis( $\eta$ -pentamethylcyclopentadienyl)chromium 75504-17-5  
75504-18-6 76505-24-3 84079-75-4 84079-76-5  
86563-55-5 91308-30-4 91308-32-6 95029-57-5 96350-48-0  
98145-63-2, Tetrakis(diethylamido)tantalum 101200-05-9  
101923-26-6 103457-72-3, Tris(bis(trimethylsilyl)amido)erbium  
109433-86-5 112379-48-3 112379-49-4 114460-02-5 114504-74-4  
122528-16-9 122676-67-9, Tris(bis(trimethylsilyl)amido)manganese  
122676-68-0 123798-11-8 123798-14-1 126970-21-6 128110-72-5,  
Aluminum silicon oxide (Al<sub>2</sub>Si<sub>8</sub>O<sub>19</sub>) 130521-76-5 130817-68-4  
131297-96-6 131297-97-7, Barium bis(bis(trimethylsilyl)amide)  
132644-88-3 133947-38-3 133947-39-4 144356-16-1 153608-51-6

154069-61-1 154294-23-2 156304-61-9, Tris((tert-butyl)(trimethylsilyl)amido)gallium 156304-62-0 169896-41-7,  
 (tert-Butylimido)tris(diethylamido)tantalum 175923-04-3  
 178881-65-7 180335-73-3 192228-19-6 194611-64-8,  
 Tris(diethylamido)gallium 201233-61-6 201941-77-7 207788-38-3  
 210758-43-3 218613-11-7, Yttrium oxide silicate (YO(SiO<sub>3</sub>)<sub>2</sub>)  
 251984-08-4 261929-98-0 300548-71-4 300548-72-5 300585-49-3  
 300585-58-4 300585-62-0 308847-87-2 312696-25-6 312739-77-8  
 329735-69-5 329735-72-0 329735-73-1 352535-01-4 404943-68-6  
 406462-34-8 406462-35-9 406462-36-0 406462-37-1 406462-38-2  
 406462-39-3 406462-40-6 406462-41-7 406462-42-8 406462-43-9  
 406462-44-0 406462-45-1 406462-46-2 406462-47-3 406462-48-4  
 406462-50-8, Aluminum metaphosphate oxide (Al<sub>2</sub>(PO<sub>3</sub>)<sub>4</sub>) 406462-53-1  
 406462-54-2 406462-56-4 406462-59-7 406462-61-1 406462-62-2  
 406462-63-3, Aluminum silicon oxide (Al<sub>2</sub>Si<sub>16</sub>O<sub>35</sub>)  
 (vapor deposition of metal silicates and  
 phosphates by reacting alkoxy silanol or alkyl phosphates with  
 metal or metalloid compd.)

IT 17906-35-3 18230-57-4  
 (vapor deposition of metal silicates by  
 reacting alkoxy silanol and alkoxy silanediol with metal or  
 metalloid compd.)

IT 3410-77-3, Tetraisocyanatosilane  
 (vapor deposition of silica by reacting  
 alkoxy silanol with)

IT 7723-14-0, Phosphorus, processes  
 (white; vapor deposition of material  
 comprising phosphorus by exposing substrate to)

L33 ANSWER 6 OF 9 HCA COPYRIGHT 2006 ACS on STN

133:185585 Compounds for use as **chemical vapor deposition** precursors, thermochromic materials light-emitting diodes, and molecular charge-transfer salts and methods of making these compounds. Diel, Bruce (Midwest Research Institute, USA). U.S. US 6103459 A 20000815, 18 pp. (English). CODEN: USXXAM. APPLICATION: US 1999-264733 19990309.

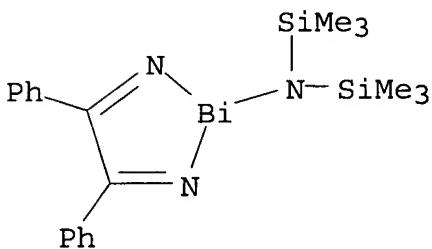
AB Novel compds. that may be used as **chem. vapor deposition** precursors, thermochromic materials, conductive polymers, light-emitting diode precursors, and mol. charge-transfer salt precursors are provided. In addn., a novel compd. that can be used to make the aforementioned compds. is provided. Still further, another aspect of the present invention is to provide methods for

making and using the novel compds. provided.

IT 288586-42-5P, 2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazabismole  
(compds. for use as **chem. vapor deposition** precursors)

RN 288586-42-5 HCA

CN 2H-1,3,2-Diazabismol-2-amine, 4,5-diphenyl-N,N-bis(trimethylsilyl)-(9CI) (CA INDEX NAME)



IC ICM G03C001-85

INCL 430530000

CC 74-9 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 42, 76

ST **chem vapor deposition** precursor  
thermochromic light emitting diode

IT **Vapor deposition** process  
(chem.; compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT Electroluminescent devices

Thermochromic materials

(compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT Charge transfer complexes

(compds. for use as **chem. vapor deposition** precursors, thermochromic materials light-emitting diodes, and mol. charge-transfer salts and methods of making compds.)

IT 288586-37-8P 288586-46-9P 288613-00-3P 288613-01-4P

(compds. for use as **chem. vapor deposition** precursors)

IT 75-44-5, Carbonic dichloride 75-77-4, reactions 84-11-7, 9,10-Phenanthrenedione 121-45-9, Trimethylphosphite 353-85-5, Trifluoroacetonitrile 463-71-8, Thiophosgene 685-24-5 773-82-0, Pentafluorobenzonitrile 4039-32-1, Lithium bis(trimethylsilyl)amide 5035-52-9 7439-95-4, Magnesium, reactions 7440-23-5, Sodium, reactions 7784-34-1, Arsenous trichloride 7787-60-2 19555-07-8 31366-25-3, Tetrathiafulvalene 95095-31-1, 1,2-Di(2,2,2-trifluoroethoxy)ethanediimine

(compds. for use as **chem. vapor deposition** precursors)

IT 7333-08-6P, Di-3-thienylglyoxal 10025-91-9P 13450-88-9P, Gallium bromide (GaBr<sub>3</sub>) 18054-46-1P, 9,10-Phenanthrenequinone-(9,10)-bis(trimethylsilyl)diimine 242478-29-1P, 2-Chloro-4,5-[9,10,d]-phenanthro-1,3,2-diazastibole 242478-31-5P, 2-Chloro-4,5-diphenyl-1,3,2-diazastibole 242478-33-7P, 2-Chloro-4,5-[9,10,d]-phenanthro-1,3,2-diazabismole 242478-34-8P, 2-Bis(trimethylsilyl)amido-4,5-[9,10,c]-phenanthro-1,3,2-diazastibole 242478-35-9P, 2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazastibole 255867-39-1P, N,N'-Bis(trimethylsilyl)-1,2-bis(pentafluorophenyl)ethanediimine 255867-40-4P 288586-32-3P, N,N'-Bis(trimethylsilyl)-1,2-bis(3-thienyl)ethanediimine 288586-33-4P, 1,1,1,4,4,4-Hexafluoro-2,3-butanediimine 288586-34-5P 288586-35-6P, 2-Chloro-4,5-di(trifluoromethyl)-1,3,2-diazastibole 288586-36-7P, 2-Chloro-4,5-di(trifluoromethyl)-1,3,2-diazabismole 288586-38-9P, 2-Phenyl-4,5-di(2,2,2-trifluoroethoxy)-1,3,2-diazastibole 288586-39-0P, 2H-Phenanthro[9,10-d]imidazol-2-one 288586-40-3P, 4,5-Di(pentafluorophenyl)-2H-imidazol-2-one 288586-41-4P, 2-[Bis(2,2,2-trifluoroethyl)]amido-4,5-di(trifluoromethyl)-1,3,2,-diazastibole 288586-42-5P, 2-Bis(trimethylsilyl)amido-4,5-diphenyl-1,3,2-diazabismole 288586-43-6P, 2-Phenyl-4,5-[9,10,c]-phenanthro-1,3,2-diazabismole 288586-44-7P, 2-Chloro-4,5-di(3-thienyl)-1,3,2-diazaarsole 288586-45-8P, 4,5-Di(3-thienyl)-2H-imidazol-2-one

(compds. for use as **chem. vapor deposition** precursors)

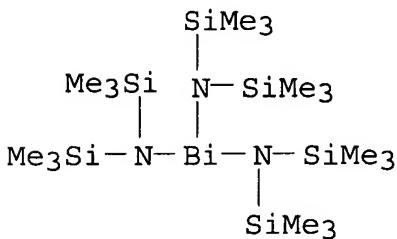
amides. Hintermaier, Frank; Van Buskirk, Peter; Roeder, Jeffrey R.; Hendrix, Bryan; Baum, Thomas H.; Desrochers, Debra A. (Siemens Aktiengesellschaft, Germany; Advanced Technology Materials, Inc.). PCT Int. Appl. WO 9929926 A1 19990617, 41 pp. DESIGNATED STATES: W: JP, KR; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US26257 19981210. PRIORITY: US 1997-69041 19971210.

AB CVD is used to form a **film** of **Bi oxide**, Sr oxide, and Ta oxide on a heated substrate by decompg. the precursors of these oxides at the surface of the substrate. The precursor of **Bi oxide** is a **Bi complex** which includes  $\geq 1$  amide group and is decompd. and deposited at  $<450^\circ$ . The film of **Bi**, Sr, and Ta oxides obtained by low-temp. CVD is predominantly nonferroelec., but can be converted into a **ferroelec.** film by subsequent heating.

IT 76505-24-3, **Bismuth tris(bis(trimethylsilyl)amide)**  
(low-temp. CVD of **bismuth strontium tantalum oxide films** using **bismuth amides**)

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C23C016-40  
ICS H01L029-00; C23C018-12; C30B025-02

CC 76-8 (Electric Phenomena)

Section cross-reference(s): 75

ST CVD **bismuth** amide low temp; **oxide**  
**bismuth strontium tantalum** low temp CVD;  
**ferroelec bismuth strontium tantalum oxide**  
**film** CVD

IT **Vapor deposition** process  
(chem.; low-temp. CVD of **bismuth strontium tantalum oxide films** using

bismuth amides)

IT Heat  
Ion beams  
Plasma  
UV radiation  
(in low-temp. CVD of bismuth strontium  
tantalum oxide films using bismuth  
amides)

IT Ferroelectric capacitors  
Ferroelectric memory devices  
MOSFET (transistors)  
(low-temp. CVD of bismuth strontium tantalum  
oxide ferroelec. films for)

IT Transistors  
(low-temp. CVD of bismuth strontium tantalum  
oxide ferroelec. films on substrates  
contg.)

IT Ferroelectric films  
(low-temp. CVD of bismuth strontium tantalum  
oxide films using bismuth amides in  
prepn. of ferroelec. films)

IT Polyamines  
Polyethers, processes  
(low-temp. CVD of bismuth strontium tantalum  
oxide films using precursors contg.)

IT 1314-35-8, Tungsten oxide (WO<sub>3</sub>), processes 7439-88-5, Iridium,  
processes 7440-05-3, Palladium, processes 7440-06-4, Platinum,  
processes 7440-16-6, Rhodium, processes 7440-57-5, Gold,  
processes 11113-84-1, Ruthenium oxide 12624-27-0, Rhenium oxide  
12645-46-4, Iridium oxide 12680-36-3, Rhodium oxide 61970-39-6,  
Osmium oxide 110621-08-4, Barium copper yttrium oxide  
(Ba<sub>2</sub>Cu<sub>3</sub>Y<sub>0.7</sub>O<sub>6</sub>) 116224-72-7, Bismuth calcium copper  
strontium oxide (Bi<sub>2</sub>Ca<sub>2</sub>Cu<sub>3</sub>Sr<sub>2</sub>O<sub>10</sub>) 119173-61-4, Zirconium nitride  
138290-45-6, Titanium nitride (TiN<sub>0.1</sub>) 226225-66-7, Tantalum  
tungsten nitride (TaWN<sub>0.2</sub>)  
(low-temp. CVD of bismuth strontium tantalum  
oxide ferroelec. films on substrates  
contg.)

IT 1304-76-3, Bismuth oxide (Bi<sub>2</sub>O<sub>3</sub>), processes 36830-74-7,  
Strontium bis(dipivaloylmethanate) 57376-43-9 57403-58-4,  
Bismuth tris(dimethylamide) 76505-24-3,  
Bismuth tris(bis(trimethylsilyl) amide)

124191-06-6

(low-temp. CVD of **bismuth** strontium tantalum  
**oxide** **films** using **bismuth** amides)

IT 150939-76-7, Bis(2,2,6,6-tetramethyl-3,5-heptanedionato)(tetraglyme)strontium 177580-53-9, Tetraisopropoxy(2,2,6,6-tetramethyl-3,5-heptanedionato)tantalum  
 (low-temp. CVD of **bismuth** strontium tantalum  
**oxide** **films** using **bismuth** amides and)

IT 112-49-2, Triglyme 143-24-8, Tetraglyme 3030-47-5 3083-10-1, N,N,N',N'',N''',N''''-Hexamethyltrienetetramine  
 (low-temp. CVD of **bismuth** strontium tantalum  
**oxide** **films** using precursors contg.)

IT 12010-48-9P, **Bismuth** niobium potassium oxide (BiNb5K2015)  
 12048-25-8P, **Bismuth** potassium titanium oxide (BiKTi206)  
 13595-86-3P, **Bismuth** tungsten oxide (Bi2W06)  
 50811-07-9P, **Bismuth** strontium tantalum oxide (Bi2SrTa209)  
 51403-91-9P, **Bismuth** niobium strontium oxide (Bi2Nb2Sr09)  
 156832-05-2P, **Bismuth** niobium strontium tantalum oxide (Bi2Nb0-2SrTa0-209) 187239-99-2P 219534-62-0P 219534-64-2P  
 219534-66-4P  
 (low-temp. CVD of **ferroelec.** **films** contg.)

IT 7722-84-1, Hydrogen peroxide, processes 7782-44-7, Oxygen, processes 10024-97-2, Nitrogen oxide (N2O), processes 10028-15-6, Ozone, processes 10102-43-9, Nitric oxide, processes 10102-44-0, Nitrogen dioxide, processes 12033-49-7, Nitrogen oxide (NO3)  
 (oxidizing agent; in low-temp. CVD of **bismuth** strontium tantalum **oxide** **films** using **bismuth** amides)

IT 1303-00-0, Gallium arsenide, processes 1309-48-4, Magnesium oxide (MgO), processes 1314-23-4, Zirconium oxide (ZrO2), processes 1344-28-1, Aluminum oxide (Al2O3), processes 7440-21-3, Silicon, processes 7631-86-9, Silica, processes 12033-89-5, Silicon nitride (Si3N4), processes 12047-27-7, Barium titanate (BaTiO3), processes 12060-00-3, Lead titanium oxide (PbTiO3) 12060-59-2, Strontium titanate (SrTiO3)  
 (substrate; low-temp. CVD of **bismuth** strontium tantalum **oxide** **films** on)

L33 ANSWER 8 OF 9 HCA COPYRIGHT 2006 ACS on STN

129:325345 Liquid precursor for formation of metal oxides. Gordon, Roy G. (The President and Fellows of Harvard College, USA). PCT Int.

Appl. WO 9846617 A1 19981022, 49 pp. DESIGNATED STATES: W: CA, JP, KR; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US7829 19980417. PRIORITY: US 1997-43279 19970417.

AB A liq. precursor is provided for the formation of metal **oxide films** comprising a mixt. of two or more types of beta-diketonate ligands bound to one or more metals. For example, a liq. mixt. was formed of the mixed Al beta-diketonates derived from two or more of the ligands 2,6-dimethyl-3,5-heptanedione; 2,7-dimethyl-3,5-heptanedione; 2,6-dimethyl-3,5-octanedione; 2,2,6-trimethyl-3,5-heptanedione; 2,8-dimethyl-4,6-nonenedione; 2,7-dimethyl-4,6-nonenedione; 2,2,7-trimethyl-3,5-octanedione; and 2,2,6-trimethyl-3,5-octanedione. The  $\beta$ -diketonate includes derivs. of  $R_1C(O)CHR_3C(O)R_2$  ( $R_1, R_2$  = alkyl, fluoroalkyl, of an O- or N-contg. alkyl;  $R_3$  = same as  $R_1$  or  $R_2$ , or H). **Films** of metal **oxides** are **deposited** from **vaporized** precursor mixts. of metal beta-diketonates and, optionally, oxygen or other sources of oxygen. This process may be used to deposit high-purity, transparent metal **oxide films** on a substrate.. The liq. mixts. may also be used for spray coating, spin coating and sol-gel deposition of materials.

IT 7440-69-9DP, **Bismuth**, mixed  $\beta$ -diketonate complexes, preparation 76505-24-3P, **Bismuth** tris[bis(trimethylsilyl)amide] (prepn. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for CVD of metal **oxide** **films**)

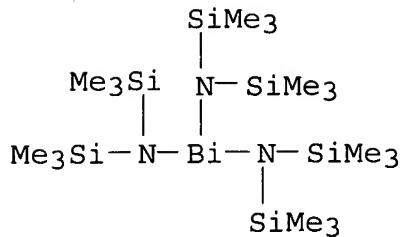
RN 7440-69-9 HCA

CN Bismuth (7CI, 8CI, 9CI) (CA INDEX NAME)

Bi

RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C07F019-00  
 ICS C23C016-00

CC 78-2 (Inorganic Chemicals and Reactions)

ST metal oxide prepн liq diketonate precursor; diketonate metal prepн liq **CVD** precursor

IT Ketones, preparation  
 (1,3-diketones, metal complexes; prepн. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Vapor deposition process  
 (chem.; of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Transition metal complexes  
 (diketone; prepн. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Ketones, preparation  
 (diketones, transition metal complexes; prepн. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Films  
 Liquid mixtures  
 (prepн. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Oxides (inorganic), preparation  
 (prepн. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for **CVD** of metal **oxide** films)

IT Coating process  
 (spin; of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for formation of metal **oxide** films)

)

IT Coating process

(spray; of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for formation of metal **oxide films**)

)

IT 1314-36-9, Yttrium **oxide** (Y2O3), reactions

(film; prepn. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for CVD of metal **oxide films**)

IT 471-34-1P, Calcium carbonate, preparation 513-77-9P, Barium carbonate 1304-76-3P, **Bismuth oxide**,preparation 1306-38-3P, Cerium **oxide** (CeO2), preparation1308-04-9P, Cobalt(III) **oxide** 1308-38-9P, Chromium**oxide** (Cr2O3), preparation 1309-37-1P, Iron **oxide**(Fe2O3), preparation 1309-48-4P, Magnesium **oxide** (MgO),preparation 1312-43-2P, Indium **oxide** (In2O3)1312-81-8P, Lanthanum **oxide** 1313-96-8P, Niobium**oxide** 1313-99-1P, Nickel **oxide**, preparation1314-13-2P, Zinc **oxide** (ZnO), preparation 1314-23-4P,Zirconium **oxide** (ZrO2), preparation 1314-61-0P, Tantalum **oxide** (Ta2O5) 1317-34-6P, Manganese **oxide**(Mn2O3) 1317-38-0P, Copper **oxide** (CuO), preparation1317-39-1P, Copper **oxide** (Cu2O), preparation 1335-25-7P,Lead **oxide** 1344-28-1P, Aluminum **oxide** (Al2O3),preparation 1633-05-2P, Strontium carbonate 7542-09-8P, Cobalt carbonate 11098-99-0P, Molybdenum **oxide** 11099-11-9P,Vanadium **oxide** 12036-10-1P, Ruthenium **oxide**(RuO2) 12047-27-7P, Barium titanium **oxide** (BaTiO3),

preparation 13463-67-7P, Titanium dioxide, preparation

18282-10-5P, Tin dioxide 37305-87-6P, Barium strontium titanate

214904-75-3P, Ruthenium **oxide** (RuO0.5)

(film; prepn. of metal complexes of mixed

$\beta$ -diketonates as liq. precursors for CVD of metal **oxide films**)

IT 123-54-6, 2,4-Pentanedione, reactions

(for attempted prepn. of tantalum complex of mixed  $\beta$ -diketonates as liq. precursors for CVD of metal **oxide films**)

IT 7664-41-7, Ammonia, reactions

(for prepn. of metal complexes of mixed  $\beta$ -diketonates as liq. precursors for CVD of metal **oxide films**)

IT 75-97-8, tert-Butyl methyl ketone 97-62-1, Ethyl isobutyrate  
 97-93-8, Triethylaluminum, reactions 108-10-1, Isobutyl methyl  
 ketone 108-64-5, Ethyl isovalerate 142-71-2, Copper(II) acetate  
 301-04-2, Lead acetate 546-68-9 557-34-6, Zinc acetate  
 563-80-4, Isopropyl methyl ketone 753-73-1, Dimethyltin dichloride  
 1118-71-4, 2,2,6,6-Tetramethyl-3,5-heptanedione 2414-98-4,  
 Magnesium ethoxide 3030-47-5, Pentamethyldiethylenetriamine  
 3236-82-6, Niobium(V) ethoxide 4039-32-1, Lithium bis(  
 trimethylsilylamide) 6074-84-6, Tantalum(V) ethoxide  
 7440-39-3, Barium, reactions 7452-79-1, Ethyl 2-methylbutyrate  
 7718-54-9, Nickel dichloride, reactions 7727-18-6, Vanadyl  
 trichloride 7782-92-5, Sodamide 7787-60-2, **Bismuth**  
 trichloride 7789-78-8, Calcium hydride 10025-73-7, Chromium  
 trichloride 10025-82-8, Indium trichloride 10099-58-8, Lanthanum  
 trichloride 10241-05-1, Molybdenum pentachloride 10361-92-9,  
 Yttrium trichloride 13477-09-3, Barium hydride 13598-33-9,  
 Strontium hydride 14024-18-1, Iron tris(acetylacetone)  
 14284-89-0, Manganese tris(acetylacetone) 17501-44-9, Zirconium  
 tetrakis(acetylacetone) 20759-14-2, Ruthenium trichloride  
 monohydrate 57526-28-0, 2-Methylbutyryl chloride 74418-77-2  
 78579-61-0, 2,2,6,6-Tetramethyl-3,5-octanedione 188530-39-4,  
 6-Ethyl-2,2-dimethyl-3,5-octanedione 212791-15-6,  
 3,7-Dimethyl-4,6-nonanedione 214904-66-2 214904-74-2  
 (prepn. of metal complexes of mixed  $\beta$ -diketonates as liq.  
 precursors for CVD of metal **oxide**  
 films)

IT 110-18-9DP, metal mixed  $\beta$ -diketonate complexes 112-24-3DP,  
 strontium mixed  $\beta$ -diketonate complexes 7307-07-5P,  
 2,7-Dimethyl-3,5-octanedione 7307-08-6P, 2,8-Dimethyl-4,6-  
 nonanedione 7333-23-5P, 2,2,6-Trimethyl-3,5-heptanedione  
 7429-90-5DP, Aluminum, mixed  $\beta$ -diketonate complexes,  
 preparation 7439-89-6DP, Iron, mixed  $\beta$ -diketonate complexes,  
 preparation 7439-91-0DP, Lanthanum, mixed  $\beta$ -diketonate  
 complexes, preparation 7439-92-1DP, Lead, mixed  $\beta$ -diketonate  
 complexes, preparation 7439-95-4DP, Magnesium, mixed  
 $\beta$ -diketonate complexes, preparation 7439-96-5DP, Manganese,  
 mixed  $\beta$ -diketonate complexes, preparation 7439-98-7DP,  
 Molybdenum, mixed  $\beta$ -diketonate complexes, preparation  
 7440-02-0DP, Nickel, mixed  $\beta$ -diketonate complexes, preparation  
 7440-03-1DP, Niobium, mixed  $\beta$ -diketonate complexes, preparation  
 7440-18-8DP, Ruthenium, mixed  $\beta$ -diketonate complexes,  
 preparation 7440-24-6DP, Strontium, mixed  $\beta$ -diketonate

triethylenetetraamine complexes, preparation 7440-25-7DP,  
Tantalum, mixed  $\beta$ -diketonate ethoxide complexes, preparation  
7440-31-5DP, Tin, mixed  $\beta$ -diketonate di-Me complexes,  
preparation 7440-32-6DP, Titanium, mixed  $\beta$ -diketonate  
isopropoxide complexes, preparation 7440-39-3DP, Barium, mixed  
 $\beta$ -diketonate complexes, preparation 7440-45-1DP, Cerium,  
mixed  $\beta$ -diketonate complexes, preparation 7440-47-3DP,  
Chromium, mixed  $\beta$ -diketonate complexes, preparation  
7440-48-4DP, Cobalt, mixed  $\beta$ -diketonate complexes, preparation  
7440-50-8DP, Copper, mixed  $\beta$ -diketonate complexes, preparation  
7440-62-2DP, Vanadium, mixed  $\beta$ -diketonate complexes,  
preparation 7440-65-5DP, Yttrium, mixed  $\beta$ -diketonate  
complexes, preparation 7440-66-6DP, Zinc, mixed  $\beta$ -diketonate  
complexes, preparation 7440-67-7DP, Zirconium, mixed  
 $\beta$ -diketonate complexes, preparation 7440-69-9DP,  
**Bismuth**, mixed  $\beta$ -diketonate complexes, preparation  
7440-70-2DP, Calcium, mixed  $\beta$ -diketonate complexes, preparation  
7440-74-6DP, Indium, mixed  $\beta$ -diketonate complexes, preparation  
12192-25-5DP, Titanyl ion, mixed  $\beta$ -diketonate complexes  
18362-64-6P, 2,6-Dimethyl-3,5-heptanedione 20644-97-7DP, Vanadyl,  
mixed  $\beta$ -diketonate complexes 69725-37-7P,  
2,2,7-Trimethyl-3,5-octanedione 76505-24-3P,  
**Bismuth tris[bis(trimethylsilyl)amide]**  
212791-13-4P, 2,6-Dimethyl-3,5-octanedione 212791-14-5P,  
2,7-Dimethyl-4,6-nonanedione 212791-16-7P, 2,2,6-Trimethyl-3,5-  
octanedione  
(prepn. of metal complexes of mixed  $\beta$ -diketonates as liq.  
precursors for CVD of metal **oxide**  
films)

L33 ANSWER 9 OF 9 HCA COPYRIGHT 2006 ACS on STN

129:285207 Bismuth amide compounds and compositions, and

**chemical vapor deposition** method of  
forming bismuth-containing films therewith. Glassman, Timothy E.;  
Bhandari, Gautam; Baum, Thomas H. (Advanced Technology Materials,  
Inc., USA). PCT Int. Appl. WO 9843988 A1 19981008, 33 pp.

DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA,  
CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,  
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA,  
UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE,  
BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT,

LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US6127 19980326. PRIORITY: US 1997-828566 19970331.

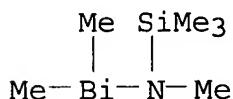
AB A method is provided of forming a Bi-contg. material layer on a substrate, comprising bubbler delivery or liq. delivery vaporization of a Bi amide source reagent to form a Bi contg. source vapor, and introducing the Bi-contg. source vapor to a CVD chamber to form the Bi-contg. material layer on the substrate. The Bi amide source reagent may include a Bi amide compd.  $\text{BiL1xL2y(NR1R2)}_z$  wherein: Z is an integer of from 1 to 3; x + y + z = 3; each of L1 and L2 is independently selected from C1-C4 alkyl, C1-C4 alkoxide,  $\beta$ -diketonate, cyclic amido, cyclic trisalkoxoamine and C6-C10 aryl; and each of R1 and R2 is independently selected from C1-C8 alkyl, C1-C8 alkoxy, C6-C8 cycloalkyl, C6-C10 aryl, C1-C4 carboxyl, and SiR33, wherein each R3 is independently selected from H and C1-C4 alkyl. Bi-contg. films of the invention may be used in the construction of spatial light modulator devices comprising a BSO (silicosillenite) layer deposited on a substrate, and an Al-Ta-oxide (ATO) insulator layer on the BSO layer.

IT 7566-56-5 76505-24-3

(for prepn. of bismuth-contg. films via CVD)

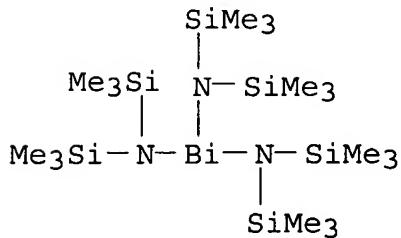
RN 7566-56-5 HCA

CN Bismuthinamine, N,1,1-trimethyl-N-(trimethylsilyl)- (9CI) (CA INDEX NAME)



RN 76505-24-3 HCA

CN Bismuthinetriamine, hexakis(trimethylsilyl)- (9CI) (CA INDEX NAME)



IC ICM C07F009-70

CC ICS C07F009-90; B32B009-00; G02F001-135; C23C016-00  
78-2 (Inorganic Chemicals and Reactions)  
Section cross-reference(s): 73

ST bismuth amide **chem vapor deposition**;  
film bismuth contg **CVD** prepn; spatial light modulator BSO  
ATO layer; silica layer **CVD** prepn

IT Amines, reactions  
(bismuth complexes; prepn. of bismuth-contg. film layers via  
**CVD** of bismuth amides)

IT **Vapor deposition process**  
(chem.; prepn. of bismuth-contg. film layers via  
**CVD** of bismuth amides)

IT Films  
(prepn. of bismuth-contg. film layer via **CVD** of bismuth  
amides)

IT Spatial light modulators  
(prepn. of spatial light modulator devices comprising BSO  
(silicosillenite) layer and insulator layer via **CVD** of  
bismuth amides)

IT 78-10-4 603-33-8, Triphenylbismuth 13170-23-5 18165-85-0,  
tert-Butylsilane 30736-07-3, Di-tert-butylsilane 124687-44-1  
129971-75-1 130234-54-7 134365-11-0 213772-33-9,  
(Tetrahydrofuran)tris(triphenylsiloxy)bismuth 213772-48-6  
(for prepn. of bismuth silicon **oxide** material  
**layers** via **CVD**)

IT 1624-01-7  
(for prepn. of bismuth silicon oxide or silicon **oxide**  
material **layers** via **CVD**)

IT 7566-56-5 57376-43-9, Tris(diethylamido)bismuth  
57376-44-0, Tris(dipropylamido)bismuth 57403-58-4,  
Tris(dimethylamido)bismuth 76505-24-3 124191-06-6,  
Tris(diphenylamido)bismuth 213772-05-5,  
Tris(dicyclohexylamido)bismuth 213772-11-3,  
Tris(cyclohexylamido)bismuth 213772-17-9, Tris(phenylamido)bismuth  
213772-23-7  
(for prepn. of bismuth-contg. films via **CVD**)

IT 17048-10-1, Tetrakis(diethylamino)silane  
(for prepn. of silicon **oxide** material **layer**  
via **CVD**)

IT 12233-73-7P, Bismuth germanium oxide (Bi<sub>12</sub>GeO<sub>20</sub>)  
(prepn. of bismuth germanium **oxide** thin film  
by **CVD** of bismuth amide)

IT 1304-76-3P, Bismuth oxide (Bi<sub>2</sub>O<sub>3</sub>), preparation  
(prepn. of bismuth **oxide** thin film by  
**MOCVD** of bismuth amide)

IT 53572-00-2P, Bismuth strontium titanate  
(prepn. of bismuth strontium titanate thin film by **CVD**  
of bismuth amide)

IT 11115-71-2P, Bismuth titanate 12441-73-5P, Bismuth titanium oxide  
(Bi<sub>12</sub>TiO<sub>20</sub>)  
(prepn. of bismuth titanium **oxide** thin film  
by **CVD** of bismuth amide)

IT 213026-42-7P, Bismuth silicon **oxide**  
(prepn. of **layer** via **CVD** of bismuth-contg.  
and silicon-contg. source reagent(s))

IT 12377-72-9P, Bismuth oxide silicate (Bi<sub>12</sub>O<sub>16</sub>(SiO<sub>4</sub>))  
(prepn. of sillenite thin film by **MOCVD** of bismuth  
amide)

IT 166877-45-8P, Bismuth strontium tantalum oxide  
(prepn. of strontium bismuth tantalate thin film by **MOCVD**  
of bismuth amide)

IT 60-29-7, Diethyl ether, uses 101-84-8 108-88-3, uses 109-99-9,  
THF, uses 110-54-3, Hexane, uses 111-65-9, Octane, uses  
142-68-7, Tetrahydropyran  
(solvent for delivery of bismuth amides in **CVD** system  
to give bismuth-contg. films)

=> d 136 1-27 ti

L36 ANSWER 1 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and Characterization of the First Azastibatrane and  
Azabismatrane

L36 ANSWER 2 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Evidence for an Unstable Bi(II) Radical from Bi-O Bond Homolysis.  
Implications in the Rate-Determining Step of the SOHIO Process

L36 ANSWER 3 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and Characterization of Chelating Triamide Complexes of  
Bismuth and Antimony

L36 ANSWER 4 OF 27 HCA COPYRIGHT 2006 ACS on STN

TI Preparation of non-cluster type bismuth compounds to be used as imaging contrast agents and for treatment of gastrointestinal disorders

L36 ANSWER 5 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Geminal arsa(III)amide and trisubstituted antimony and bismuth amides from the sterically hindered, N-functionalised amido ligand [{2-(6-Me)C5H3N}NSiMe3] -

L36 ANSWER 6 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Method for preparation of organic compound using organobismuth compound

L36 ANSWER 7 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and characterization of the first examples of 1,3,2-diazastibole and 1,3,2-diazabismole ring compounds

L36 ANSWER 8 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Homoleptic bismuth amides

L36 ANSWER 9 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Bismuth compounds

L36 ANSWER 10 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and Characterization of Group 13 and 15 Selenolates and Tellurolates and the x-ray Crystal Structures of Ga[TeSi(SiMe3)3]3, In[SeC(SiMe3)3]3, {In[SeSi(SiMe3)3]3}2( $\mu$ -DMPE), and P[SeSi(SiMe3)3]3

L36 ANSWER 11 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Chalcogenolato complexes of bismuth and antimony. Syntheses, thermolysis reactions, and crystal structure of Sb(SC6H2Pri3-2,4,6)3

L36 ANSWER 12 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and crystal structure of E.O. Fischer's "red crystalline modification of tris-cyclopentadienylbismuth, ( $\eta$ 1-C5H5)3Bi"

L36 ANSWER 13 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Monomeric volatile alkoxides of chromium and bismuth

L36 ANSWER 14 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Metal-N,N'-bis(trimethylsilyl)benzamidinates: synthesis and crystal

structure of bis[N,N'-bis(trimethylsilyl)benzamidinato]chromium(II),  
[PhC(NSiMe<sub>3</sub>)<sub>2</sub>]<sub>2</sub>Cr

L36 ANSWER 15 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI X-ray crystal structure of bismuth dimethylamide

L36 ANSWER 16 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Molecular precursors of bismuth oxides;  $\beta$ -diketonates and alkoxides. Molecular structure of  $[Bi_2(\mu_2,\eta^1-OC_2H_4OMe)_4(\eta^1-OC_2H_4OMe)_2]_\infty$  and of  $Bi(OSiPh_3)_3(THF)_3$

L36 ANSWER 17 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and x-ray crystal structure of a homoleptic bismuth amide

L36 ANSWER 18 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Cyclic bis(amino)arsenic, -antimony, and -bismuth chlorides and a special tris(amino)bismuthane

L36 ANSWER 19 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Dimethylantimony azide. Preparation, spectra and crystal structure. Dimethylbismuth azide. Synthesis and crystal structure. Trimethyllead azide. Refinement of the crystal structure

L36 ANSWER 20 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Bulky alkyls, amides, and aryloxides of main group 5 elements. Part 1. Persistent phosphinyl and arsinyl radicals MRR' and their chloro precursors MRR'Cl and related compounds

L36 ANSWER 21 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Organometallic diazoalkanes. XVI. Synthesis of silyldiazoalkanes Me<sub>3</sub>Si(LnM)CN<sub>2</sub>

L36 ANSWER 22 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Organometallic diazoalkanes. XIV. Synthesis of arsenic diazoalkanes MeAs(LnM)CN<sub>2</sub>

L36 ANSWER 23 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Organometallic diazo compounds. VII. Diazoalkanes Me<sub>2</sub>MC(N<sub>2</sub>)R of the Group VB elements arsenic, antimony, and bismuth

L36 ANSWER 24 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Cyclopentadienyls (CH<sub>3</sub>)<sub>2M- $\sigma$ -C<sub>5</sub>H<sub>5</sub> of indium, antimony, and</sub>

bismuth

L36 ANSWER 25 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI N-Plumbylketenimines and O-plumbylketene acetals through  
1,4-hydroplumbation of conjugated unsaturated systems

L36 ANSWER 26 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Organosilylaminies of arsenic, antimony, and bismuth

L36 ANSWER 27 OF 27 HCA COPYRIGHT 2006 ACS on STN  
TI Metathetical reactions of organotin compounds: their use in  
amination

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L37 ANSWER 1 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Syntheses, Structures, and Dynamic Behavior of Chiral Racemic  
Organoantimony and -bismuth Compounds RR'SbCl, RR'BiCl, and RR'SbM  
[R = 2-(Me<sub>2</sub>NCH<sub>2</sub>)C<sub>6</sub>H<sub>4</sub>, R' = CH(Me<sub>3</sub>Si)<sub>2</sub>, M = H, Li, Na]

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TI Biosynthesis and immunosuppressive and neurotrophic activity of  
FK-506 and FK-520 analogs

L37 ANSWER 3 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Synthesis and X-ray Crystal Structures of Novel Al-Bi and Ga-Bi  
Compounds

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TI Synthesis and characterization of 1-aza-allyl complexes of aluminum,  
gallium and bismuth

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TI The dramatic influence of diamidoamine ligands on the structure and  
reactivity of low-valent tin and bismuth derivatives

L37 ANSWER 6 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI UV absorbents for manufacturing cosmetics

L37 ANSWER 7 OF 24 HCA COPYRIGHT 2006 ACS on STN

TI Water-soluble non-ionic triarylbismuthines. First synthesis and properties

L37 ANSWER 8 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Mild aryl ether formation in the semisynthesis of the novel macrolide immunosuppressant L-732,531

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TI Bis-amido- complexes of heavier Group 15 metal chlorides with the sterically hindered, N-functionalized amido ligand, [{2-(6-Me)C5H3N}NSiMe3] -

L37 ANSWER 10 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Preparation of dendritic organobismuth compounds

L37 ANSWER 11 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Inner-complex compounds of 5-trimethylsilylmethylthio-8-mercaptopquinoline

L37 ANSWER 12 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Cyclometallaphosphazenes of antimony(III) and bismuth(III): synthesis and characterization

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TI Tris(substituted phenyl)bismuth derivative

L37 ANSWER 14 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Polycyclic amides and silylamides of Ge, Sn, As, Sb and Bi

L37 ANSWER 15 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Preparation of O-heteroaryl, O-alkylheteroaryl, O-alkenylheteroaryl and O-alkynylheteroarylmacrolides having immunosuppressive activity

L37 ANSWER 16 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI Microbial transformation product having immunosuppressive activity

L37 ANSWER 17 OF 24 HCA COPYRIGHT 2006 ACS on STN  
TI O-heteroaryl, O-alkylheteroaryl, O-alkenylheteroaryl and O-alkynylheteroarylrapamycin derivatives for treatment of autoimmune, inflammatory, and other diseases

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TI Preparation of heteroaryl-substituted macrolides as immunosuppressants

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TI Alkylation of (As, Sb, Bi)Cl<sub>3</sub>: Formation of [(As, Sb, Bi)RCl<sub>2</sub>], (E)-[BiR(CH<sub>2</sub>CH:C)(SiMe<sub>3</sub>)(C<sub>5</sub>H<sub>4</sub>N-2)] and 2-CH(SiMe<sub>3</sub>)<sub>2</sub>C<sub>5</sub>H<sub>4</sub>N-5-R [R = C(SiMe<sub>3</sub>)<sub>2</sub>C<sub>5</sub>H<sub>4</sub>N-2]

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TI Complexes of group 15 metals with sterically hindered thiolate ligands. Crystal and molecular structures of [Sb(2-SC<sub>5</sub>H<sub>4</sub>N)3], [Sb(2-SC<sub>5</sub>H<sub>3</sub>N-3-SiMe<sub>3</sub>)<sub>3</sub>], and [Bi(2-SC<sub>5</sub>H<sub>3</sub>N-3-SiMe<sub>3</sub>)<sub>3</sub>]

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TI Synthesis, x-ray structures, and reactivity of the first bis(amino)metallastibanes and bis(amino)metallabismuthanes

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TI N,N,N'-Tris(trimethylsilyl)organoamidine as reagents in complex chemistry

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TI The element-nitrogen double bond in cations of cyclic bis(amino)phospha-, -arsa-, -stiba-, and -bismuthines

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TI The chemistry of the silazanes. III. The reactions of silazanes with trihalides of Groups III and V elements